

# Multiple Input - Multiple Output (MIMO) SAR

Completed Technology Project (2014 - 2015)



## Project Introduction

This effort will research and implement advanced Multiple-Input Multiple-Output (MIMO) Synthetic Aperture Radar (SAR) techniques which have the potential to improve science observations with remote sensing radars.

We will investigate emerging techniques in MIMO SAR which have the potential to improve scientific observations of important science parameters. Some of the techniques we will explore include SAR tomography, multi-channel orthogonal waveform operation, multi-channel waveform diversity, and imaging with signals of opportunity. These techniques can potentially provide high resolution wide swath SAR images, azimuth ambiguity suppression, low PRF Wide Swath SAR, which are not currently achievable with conventional SAR systems.

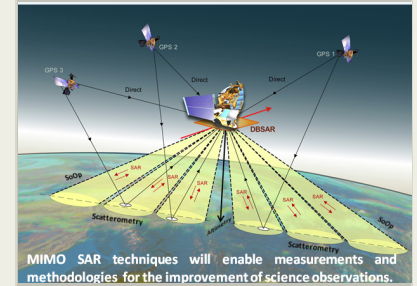
## Anticipated Benefits

These techniques can potentially provide high resolution wide swath SAR images, azimuth ambiguity suppression, low PRF Wide Swath SAR, which are not currently achievable with conventional SAR systems. Moreover, these techniques can be implemented with the advanced SAR architectures developed at Goddard: EcoSAR and the Next Generation Digital Beamforming SAR (DBSAR-2).

MIMO SAR techniques will be the enable the "Next Generation" radar systems with capabilities in remote sensing beyond the current state of the art. These radars will in turn enable new measurements and techniques which overcome inherent limitations in conventional radar designs, and enable new measurements and imaging techniques, benefiting NASA, the radar science community, and society.

These techniques also have the potential to benefit commercial SAR system applications and providers.

This technology have potential benefits to other government agencies including the DOD and NOAA.



MIMO

## Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Links	3
Project Website:	3
Technology Areas	3

# Multiple Input - Multiple Output (MIMO) SAR

Completed Technology Project (2014 - 2015)



## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

### Primary U.S. Work Locations

Maryland

## Organizational Responsibility

### Responsible Mission Directorate:

Mission Support Directorate (MSD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Center Independent Research & Development: GSFC IRAD

## Project Management

### Program Manager:

Peter M Hughes

### Project Manager:

Terence A Doiron

### Principal Investigator:

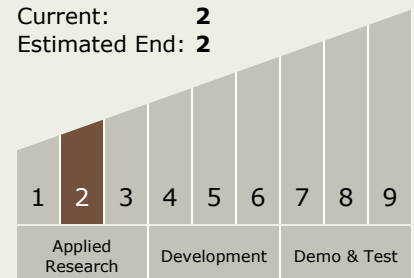
Rafael F Rincon

## Technology Maturity (TRL)

Start: 2

Current: 2

Estimated End: 2

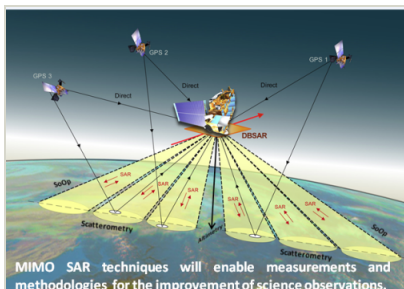


# Multiple Input - Multiple Output (MIMO) SAR

Completed Technology Project (2014 - 2015)



## Images



## MIMO

MIMO

(<https://techport.nasa.gov/image/16851>)

## Links

NASA's L-Band Digital Beamforming Synthetic Aperture Radar  
(<http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=5971781>)

NTR 1438168194  
(no url provided)

## Project Website:

<http://aetd.gsfc.nasa.gov>

## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves